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REMARKS

Amendment to the Specification

Amendments have been made in the Specification to the paragraph starting on page 3, line 15, and to the Specification paragraph starting on page 4, line 13, to complete the last sentence of each paragraph and elaborate on a term used in the last sentence (with the first paragraph used as an example):

“...The semiconductor wafer 14...rotates in the direction indicated by the arrow 22. A thermally conducting non-stick surface 28 is shown under the top plate 16 in contact with the semiconductor wafer 14. As the top plate 16 rotates..., it traverses the semiconductor wafer 14 along the horizontal plane...whereby a low dielectric constant (low-k) ILD layer on the semiconductor wafer 14 is stretched to give rise to a linear molecular arrangement. The linear molecular arrangement in the ILD layer improves its physical characteristics: e.g., mechanical strength and for conducting polymers, lower resistivity.” [underlining for clarity]

The motions of the parts disclosed by the Applicant in each paragraph provide an effect on the ILD layer, which would be apparent to those having ordinary skill in the art from the disclosure. However, to clarify this effect, the paragraph has been amended to explain that the motions have an analogous effect to that of a rolling pin on pie dough to stretch the ILD layer to improve its physical characteristics. No new matter has been entered by the amendment.

A further amendment has been made to the paragraph starting on page 4, line 13, to correct a typographical error of “termally” to “thermally”.

Claim Rejections - 35 USC §103

Claims 2-6 are rejected under 35 USC §103(a) as being unpatentable over Levert et al. (USPN 6,407,006, hereinafter “Levert”) in view of Smith et al. (USPN 6,022,812, hereinafter “Smith”) and Twu et al. (USPN 6,589,872, hereinafter “Twu”).

Levert provides an apparatus for planarizing or patterning a dielectric film on a substrate. The apparatus includes a press for applying contact pressure to an operably connected compression tool. The compression tool has a working face that is planar or

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patterned. A controller for regulating the position, timing and force applied by the compression tool to the dielectric film is also provided. There is also provided a support, with an optional workpiece holder for supporting the substrate and dielectric film during contact with the compression tool. Methods of using the apparatus, as well as planarized and/or patterned dielectric films are also provided. [Levert Abstract]

Smith provides a process for vaporizing at least one alkoxysilane composition; depositing the vaporized alkoxysilane composition onto a substrate; exposing the deposited alkoxysilane composition to a water vapor, and either an acid or a base vapor; and drying the exposed alkoxysilane composition, thereby forming a relatively high porosity, low dielectric constant, silicon containing polymer composition on the substrate. [Smith Abstract]

Twu teaches applying slurry during the process of chemical mechanical polishing of copper surfaces. By varying the rate of slurry deposition, starting out with a low rate of slurry flow that is increased as the polishing process proceeds, good planarity for copper surfaces is obtained while saving on the amount of slurry that is being used for the copper surface polishing process. [Twu Abstract]

Regarding claims 2-6, the independent claim 2 has been clarified to amend the previously claimed combination to now include the limitation that:

“applying mechanical pressure to the ILD layer on the semiconductor wafer having the first rotary motion using a mechanical device, the applying the mechanical pressure includes providing a second rotary motion and a traverse motion between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization whereby the ILD layer on the semiconductor wafer is stretched to give rise to a linear molecular arrangement;” [underlining for clarity]

The above is clarification of what is accomplished by the motions described in the “applying mechanical pressure” portion of the claim element, and is supported by that portion of the claim and the Specification in the paragraph starting on page 3, line 15, and in the paragraph starting on page 4, line 13

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Neither Levert nor Smith teaches or suggests rotating the wafer holder or having first and second rotary motions, and Twu teaches a chemical removal process (CMP) that teaches away from a combination with Levert and Smith, which are mechanical processes.

Regarding claims 3-6, these dependent claims respectively depend from independent claim 2 and are believed to be allowable since they contain all the limitations set forth in the independent claim from which they depend and claim additional unobvious combinations thereof.

Based on the above, it is respectfully submitted that claims 2-6 are now allowable under 35 USC §103(a) as being patentable over Levert in view of Smith and Twu.

Claims 8-14 are rejected under 35 USC §103(a) as being unpatentable over Levert et al. (USPN 6,407,006, hereinafter "Levert") in view of Oaks et al. (USPN 6,083,661, hereinafter "Oaks") in view of Smith et al. (USPN 6,022,812, hereinafter "Smith") and Doan et al. (USPN 6,331,488, hereinafter "Doan").

Levert has been summarized above.

Oaks discloses photodefineable cyclobutarene compositions. These polymer compositions are useful in composites, laminates, membranes, films, adhesives, coatings, and electronic applications such as multichip modules and printed circuit boards. [Oaks Abstract]

Smith has been summarized above.

Doan provides a method of manufacturing semiconductor devices using an improved chemical mechanical planarization process for the planarization of the surfaces of the wafer on which the semiconductor devices are formed. The improved chemical mechanical planarization process includes the formation of a flat planar surface from a deformable coating on the surface of the wafer filling in between the surface irregularities prior to the planarization of the surface through a chemical mechanical planarization process. [Doan Abstract]

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Regarding claims 8-14, the independent claim 8 has now been clarified to amend the previously claimed combination to now include the limitation that:

"applying mechanical pressure to the ILD layer on the semiconductor wafer having the first rotary motion using a mechanical device to apply rotating pressure to the ILD layer in the oven, the applying the mechanical pressure includes providing a second rotary motion and a traverse motion between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization whereby the ILD layer on the semiconductor wafer is stretched to give rise to a linear molecular arrangement;" [underlining for clarity]

The above is clarification of what is accomplished by the motions described in the "applying mechanical pressure" portion of the claim element, and is supported by that portion of the claim and the Specification in the paragraph starting on page 3, line 15, and in the paragraph starting on page 4, line 13

Levert, Oaks, or Smith do not teach or suggest rotating the wafer holder or having first and second rotary motions, and Doan teaches a chemical removal process (CMP) that teaches away from a combination with Levert and Smith, which are mechanical processes, and Oaks, which is a composition.

Regarding claims 9-14, these dependent claims respectively depend from independent claim 8 and are believed to be allowable since they contain all the limitations set forth in the independent claim from which they depend and claim additional unobvious combinations thereof.

Based on the above, it is respectfully submitted that claims 8-14 are now allowable under 35 USC §103(a) as being patentable over Levert in view of Oaks and in view of Smith and Doan.

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Conclusion

In view of the above, it is submitted that the claims are in condition for allowance and reconsideration of the rejections is respectfully requested. Allowance of claims 2-6 and 8-14 at an early date is solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including any extension of time fees, to Deposit Account No. 50-0374 and please credit any excess fees to such deposit account.

Respectfully submitted,



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